MINISTRY OF AGRICULTURE, EGYPT.

Egypt. —

COTTON RESEARCH BOARD.

PRELIMINARY REPORT.

MARCH 1920.

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EXCELLENCY,

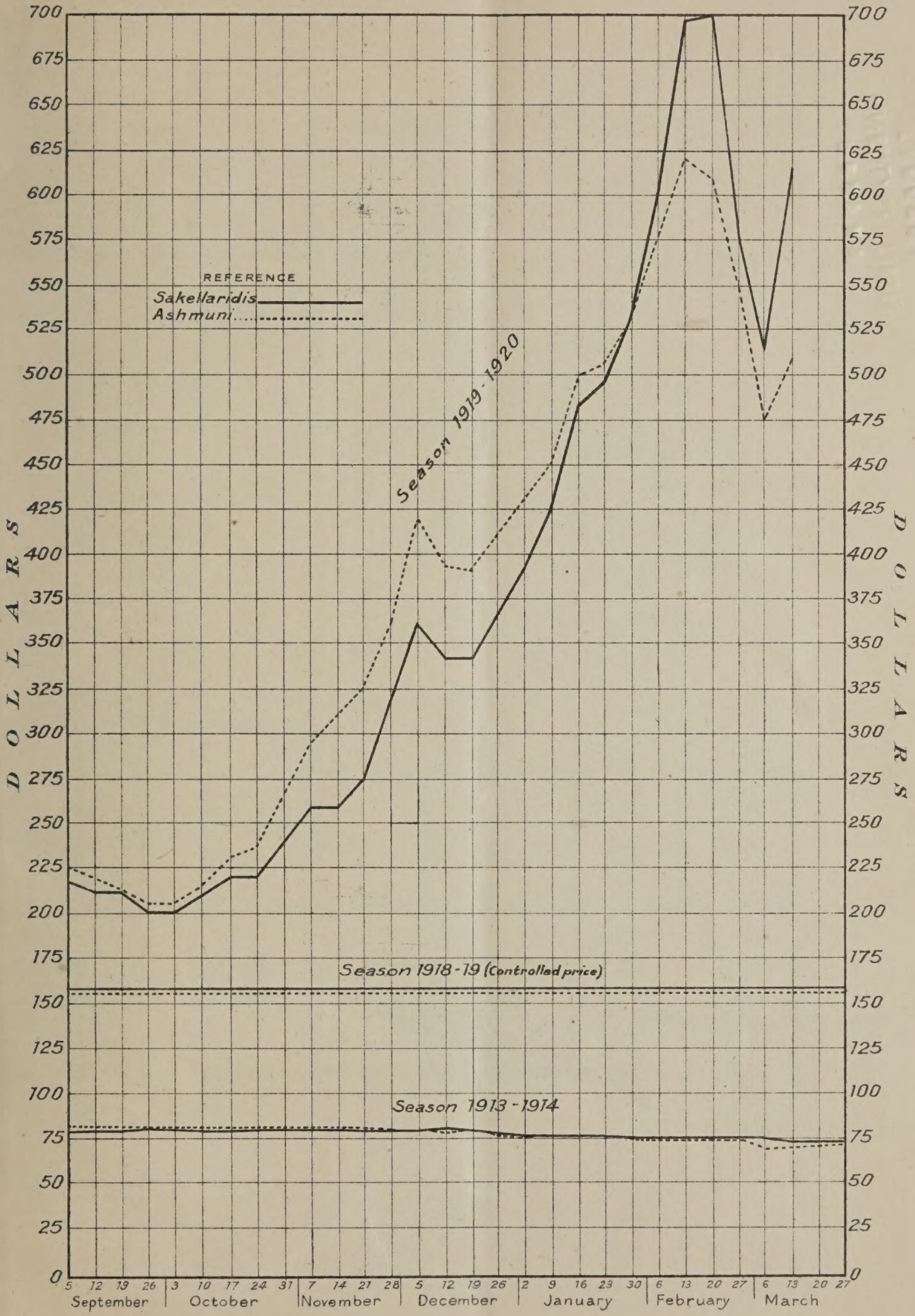
I have the honour to forward a Preliminary Report of the Cotton Research Board. This, as its title implies, is a programme of work projected, rather than a record of work done. The Board hopes to present at the end of the 1920–1921 cotton season, a full report of the year's work. This will contain an account of the experiments, which are only outlined herein, and a record of the conclusions which may be derived from them.

I have the honour to be,
Excellency,
Your obedient servant,

A. T. McKILLOP,
Chairman.

762712

Diagram showing comparative value of Sakellaridis and Ashmuni Cotton per feddan. The values plotted are the product of the weekly prices quoted by the Alexandria General Produce Association by the average yield per feddan taking Sakellaridis at 3·75 and Ashmuni at 4·5 Qantars per feddan.



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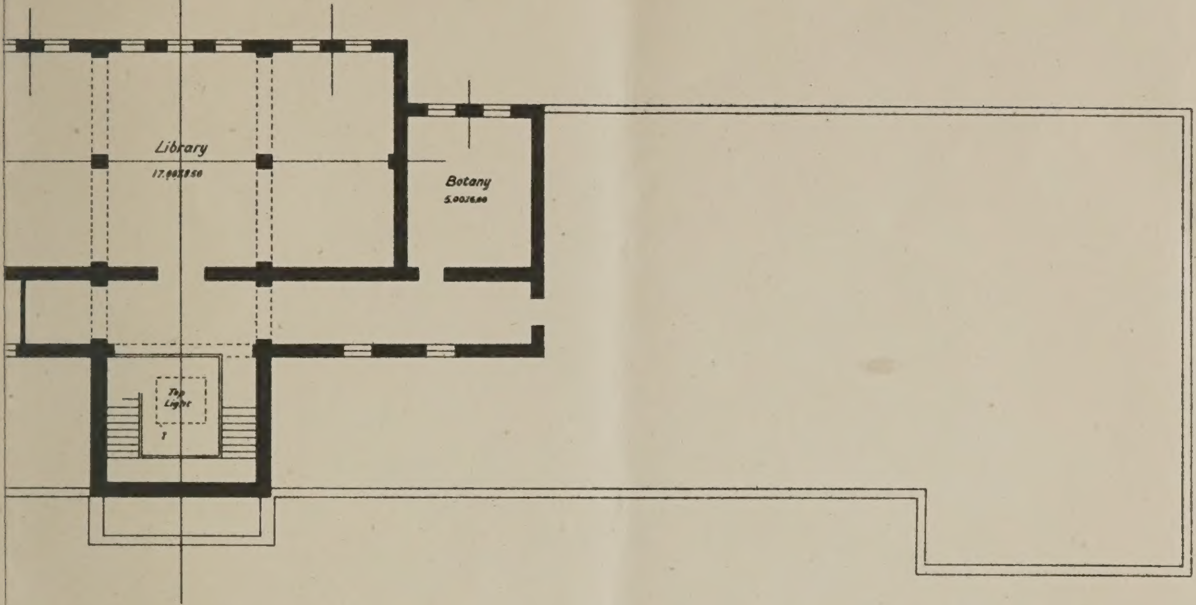
LABORATORY BUILDINGS

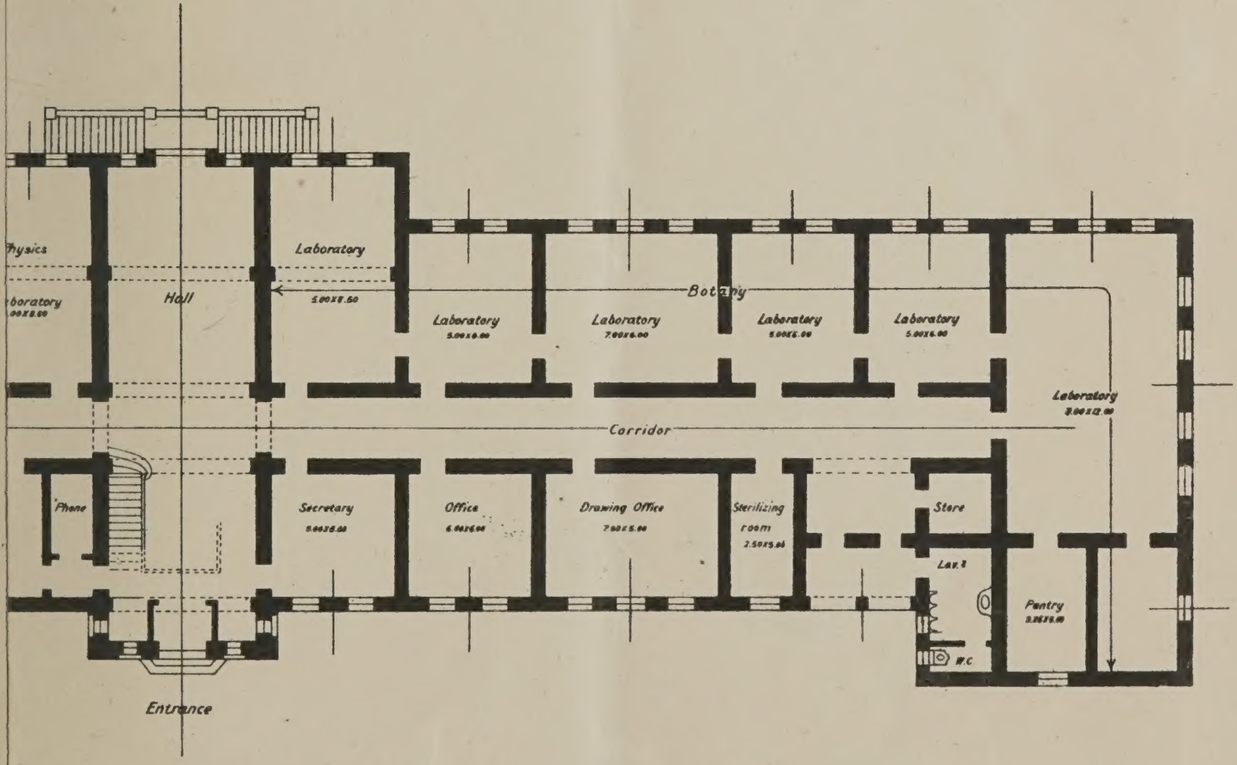
COTTON RESEARCH BOARD, GIZA.

PLAN

Scale 1:300



First Floor Plan



Ground Floor Plan

LABORATORY BUILDINGS

COTTON RESEARCH BOARD, GIZA.

PLAN

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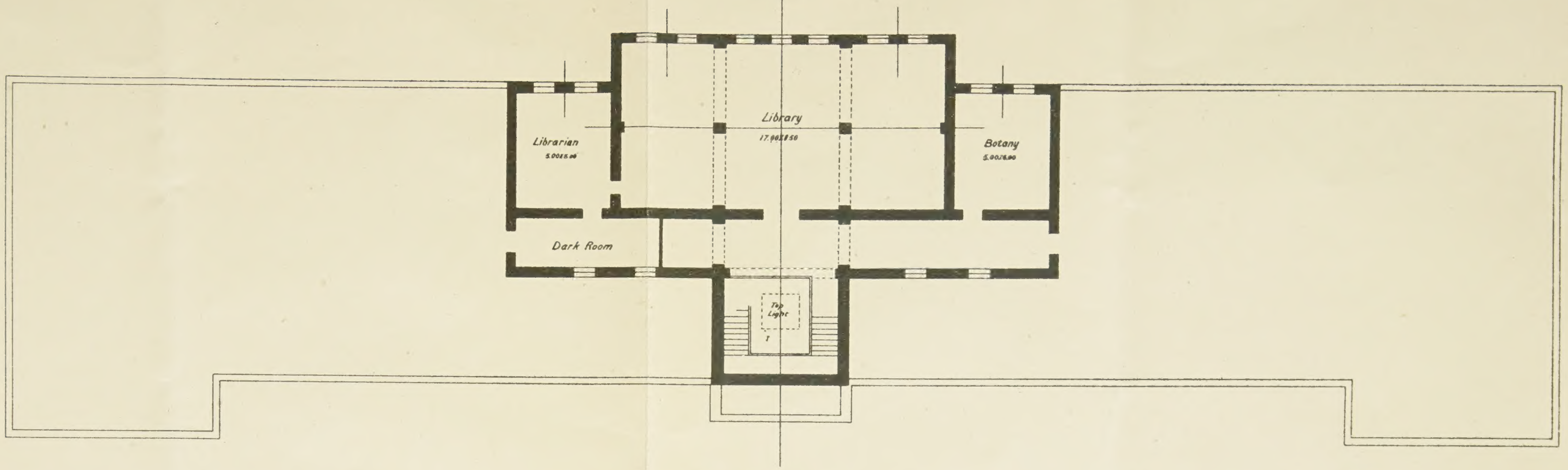
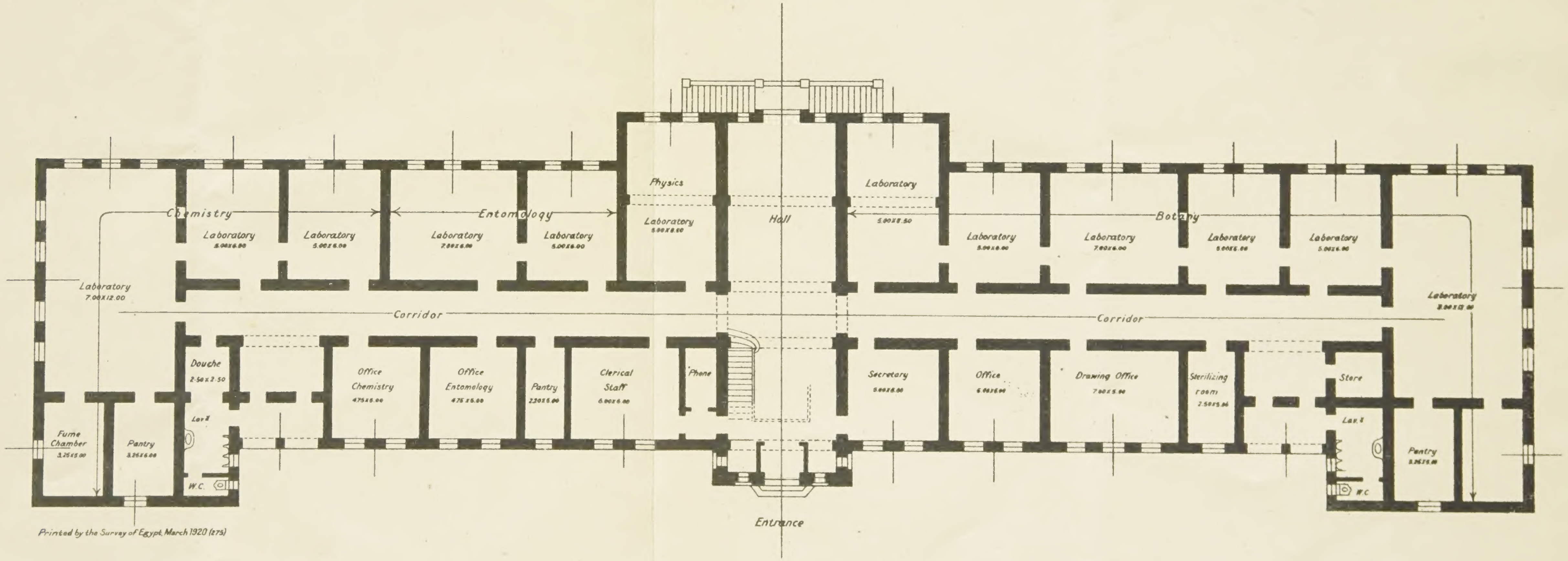


First Floor Plan



Printed by the Survey of Egypt, March 1920 (275)

Ground Floor Plan

COTTON RESEARCH BOARD, EGYPT.

PRELIMINARY REPORT.

In the character of its climate and of its soil, in its highly developed irrigation system and its large and industrious agricultural population, Egypt enjoys conditions particularly favourable to the cultivation of cotton. When it is added that the characteristic types of cotton which have been evolved in Egypt combine a high yield with a quality unsurpassed by that of any other cotton grown in considerable quantity, it will be appreciated that cotton is a crop of more than ordinary importance to Egypt. It is not surprising, therefore, that from the time when the possibilities of Egypt as a considerable cotton-producing country were first fully realized, which dated from the stimulus given to cotton-growing by the high prices ruling in the period of the American civil wars, there was an almost continuous expansion of the area under cotton up to the point which was reached a good many years ago, where further appreciable expansion was practically impossible without the extension of the cultivable area of Egypt. Cotton, in fact, has been for long the dominant factor in Egyptian agriculture, and the prosperity of Egypt is bound up, in a particularly intimate manner, with the success of the cotton crop.

The Egyptian Government has recognized the unique importance of cotton to Egypt by appointing commissions, from time to time, to study particular matters affecting its welfare, but for some time the need has been felt of a permanent organization for conducting research into all matters relating to the cultivation of cotton, and, on the conclusion of the war, steps were taken to meet this want by the establishment of a Cotton Research Board. In view of the interest aroused in this country and abroad by the creation of this Board, it seems desirable to issue a preliminary report giving a brief account of its objects and of what it has so far been able to accomplish.

Past experience has shown the disadvantages attaching to the investigation of cotton problems from the point of view of any one branch of science, however eminent the investigator and whatever the range of his experience in his own particular subject, and the Board was primarily constituted to bring together experienced workers in those various branches of science which are intimately connected with agriculture (botany, entomology, chemistry, and physics), and so form a body whose duty would be to initiate and direct scientific research into all matters connected with the cultivation of the cotton plant.

In the *Journal Officiel* of May 19, 1919, an order appeared constituting a Cotton Research Board "to combine, co-ordinate, and extend research of cotton." At the same time, the Ministry of Agriculture published an explanatory note in which it was pointed out that "it is of the greatest economic importance to Egypt that every possible step should be taken to maintain the quality of cotton produced in Egypt, so that she may not be displaced from the position of the grower of the best and therefore most valuable cotton of the world"; and that "it is of the greatest importance to Egypt to maintain the quantity of cotton which can be grown from each *feddân* of land. This may be increased or reduced by good or bad cultivation, use of good or bad seed, good or bad methods of watering, and by successful efforts to fight the pests of cotton, such as the cotton worm and boll worm."

The Board reports to the Ministry of Agriculture, but also forwards copies of its minutes to the Under-Secretaries of State for Public Works and Finance respectively.

The first meeting of the Board was held on May 31, 1919. After certain points of constitution and policy had been discussed, the necessity of finding laboratory accommodation at an early date was agreed to. As no suitable accommodation was obtainable, the Board decided to build. A site was then selected at Gîza, and the plans were prepared by the State Buildings Department. These plans were approved, and on August 27, 1919, the Council of Ministers granted a sum of L.E. 25,000 for the erection of the laboratories. (*See* plate of ground plan.) At the present time this building is advancing rapidly towards completion, and it is hoped that it will be ready for occupation in June next.

In addition to the members of the Board, a large number of special scientific workers will be necessary to carry out the laboratory and field work already planned, A great deal of assistance will also be required from the officials of the Ministry of Agriculture and of the State Domains Administration in carrying out the Board's programme of work. The technical staff suggested is as follows :—

Botanical Section	Non-Egyptian ...	6
	Egyptian	12
Entomological Section ...	Non-Egyptian ...	2
	Egyptian	4
Chemical Section	Non-Egyptian ...	2
	Egyptian... ...	2
Physical Section	Non-Egyptian ...	1
	Egyptian	2

With reference to the non-Egyptian staff, three have already been appointed, and three other posts have been allotted, but have not yet been filled. The remaining five posts have been asked for, but are not yet sanctioned.

The work of the Board received a temporary check in September owing to the death of its chairman, Lieut.-Colonel B. F. E. Keeling, O.B.E., M.C., whose loss has been very deeply felt. In November Mr. A. T. McKillop, Inspector-General of the Ministry of Agriculture, was appointed temporary chairman, and the Board now meets regularly twice a month. Up to the present fifteen meetings have been held, and the field experiments enumerated below are being carried out in different localities. These experiments are :—

1. The effect of the subsoil water level on cotton.
2. Reduced watering experiments.
3. Yield tests of nine varieties of cotton.
4. Spacing tests.

As an instance of the amount of work entailed by only one of these experiments, the proposed variety tests may be taken. Nine varieties of cotton will be grown on the chess-board system at five stations. When the necessary sub-divisions are made there will be 270 plots. If the number of plants under observation in each plot be placed at a minimum figure of 100 plants, the work involved for the Botanical Section alone amounts to regular counts of flowers and bolls of 27,000 plants during several months of the year.

Similarly with regard to the Entomological Section. Thus to test the incidence of loss due to the pink boll worm, the entire yield of at least 300 plants per plot is required. The collection of this amount of material represents ten days' work for a trained man, all of which falls within a period of only a few days, and to carry out these observations at only one of the five experimental stations entails picking the bolls from 16,000 plants, which means in round figures (taking an average of 20 bolls per plant) that 320,000 bolls will have to be picked and each one separately packed in paper.

In addition to the above, the agricultural and physical aspects of these experiments will require attention.

Apart from the above experiments the following programme has been laid down :—

1. *Botanical.*—The application of plant-breeding methods to the purification of existing commercial varieties, and to the production of new and improved varieties. Cotton-seed farms are being developed for the multiplication of pure seed strains. The physiological aspects of the problems connected with plant breeding will come under study as soon as the post provided on the botanical establishment for the

appointment of a plant physiologist can be filled. The mycologist will make a special study of cotton wilt, but other fungoid diseases of cotton will also engage his attention.

2. *Entomological.*—The study of the life history, distribution and control of *Oxycarenus hyalinipennis* (cotton seed bug) and *Agrotis ypsilon* (cut-worm). The study of the pink boll worm is being continued.

3. *Chemical.*—Observations in connection with manures and subsoil water. A study of the bacteriology of Egyptian soil. The chemical investigations arising out of the composition of cotton seed and the changes which occur during storage.

4. *Physical.*—The physicist will be mainly occupied with the field experiments. In addition he will do a good deal of laboratory work on the measurements of length, strength, thickness, uniformity, etc., of cotton fibre. He will also be engaged on the statistical work resulting from the field experiments.

The advantages of having experiments inaugurated and controlled by the Board is already evident, and, whereas in the past experiments have been carried out from the point of view of one branch of science only, such experiments will now be conducted by botanists, entomologists, physicists, chemists and agriculturists, all working in close co-operation.

On the entomological side the very important question of the value of the campaign against the pink boll worm instituted by the Ministry of Agriculture has been referred to the Board by the Under-Secretary of State, for an expression of opinion, and a report presented by one of the entomologists attached to the Ministry has been studied and various suggestions made.

The formation of a library having reference to cotton has been arranged for, as also the immediate publication of various preliminary reports made by members of the Ministry of Agriculture, and the results of all research work carried out by the Board will be published at the earliest possible moment.

Material is being collected from which to prepare a summary of previous research work in Egypt bearing on cotton. In this connection a preliminary bibliography of publications issued since 1900 relating to cotton in Egypt is given in Appendix 1.

It may be of interest if brief reference is made to the recent position of the cotton crop in Egypt For some years before the war the area under cotton had remained nearly constant. Table A illustrates this. The areas are compiled from *sarafs*' (tax collectors') returns. In 1909 and 1910 the Survey of Egypt measured the area under cotton, and compared their result—obtained by actual measurement—with the *sarafs'* figures. Taking the total for the whole country, the *sarafs'* figures were considered sufficiently accurate to warrant their acceptance. It is doubtful, however, whether the figures for 1915 and 1918 (the two years when the areas under cotton were controlled) are as accurate, due to the fear of the cultivators to return an area greater than that permitted by law. The areas for these two years, therefore, are probably slightly below the actual. This was proved in 1918 by actual measurements, again taken by the Survey of Egypt when the figures were :—

Survey	1,361,164 *feddâns*
Sarafs...	1,315,572 *feddâns*

a difference of 45,592 *feddâns*, or 3·35 per cent. In Table A the *sarafs'* area has been taken, making the yield per *feddân* 3·66 ; if the Survey figures were taken, the yield per *feddân* would be 3·54.

In 1915 the low price ($ 19 per *qantâr*) did not tempt the cultivators to the same extent to plant more cotton than permitted by law. It is probable, therefore, that the *sarafs'* figures for 1915 more nearly represent the truth.

There is still a slight tendency towards extension, but it is evident that the limits of cotton cultivation under existing irrigation conditions have very nearly been reached.

During the war period there was, for several reasons, a considerable reduction in the area under cotton, and at the same time there was a marked decline in the average yield per *feddân* as compared with the years immediately preceding the war. This decline in average yield can be mainly attributed to the ravages of the pink boll worm, which had been first reported in Egypt in 1910, and which by 1914 had become so widespread as to constitute a menace of the first magnitude. The total production during the last few years has, therefore, been considerably below the normal, a fact which has excited considerable uneasiness among the users of Egyptian cotton. Under the stimulus of the phenominally high prices ruling at present there is little doubt that the area under cotton in the coming season will surpass its former limits, but it is doubtful whether the total output of crop will reach pre-war figures for some time to come owing to the severe loss caused by the pink boll worm. This decline in average yield is a serious matter for the cotton producer, but hitherto it has hardly been brought home to him, as it has been more than compensated for by the enhanced prices which have been paid for the crop. Nevertheless, it remains a serious and disturbing factor, and measures to remedy the causes are engaging the serious attention of the Cotton Research Board.

A special feature of the present boom in Egyptian cotton is the relatively low premium on fine long stapled varieties, such as Sakel, compared with the shorter stapled cottons of the Upper Egypt class. From the cultivator's point of view the latter, with the prices prevailing, was a good deal more profitable to grow than the former, on account of their higher yield per *feddân*—from September 1919 to January 1920 (*vide* diagram). Apparently something similar has recently happened in America. One reason for the present shortage of long staple cotton in that country is the fact that in 1918 the premium obtainable for such was so low that the area devoted to long staple cotton in 1919 was much reduced. Already there is a marked tendency on the part of cultivators in Lower Egypt to substitute for Sakellaridis, Upper Egyptian and other cottons of short staple but relatively high yield. Unless purchasers recognize this fact, and are prepared to offer a substantial premium on cotton of the Sakel type, there is danger that the cultivation of the shorter stapled cottons will be very much extended at the expense of the former.

In conclusion, it should be appreciated that lost opportunities cannot be retrieved at once, and that the Board must be accorded a considerable interval thoroughly to study the situation and to initiate and carry through new work.

Good scientific work cannot be hurried, nor can results of research be guaranteed to programme. It is therefore essential that the Board should be accorded a proper measure of confidence both in Egypt and England, and that it should not be hustled by impatient criticism into forming premature conclusions.

TABLE A.—Showing Areas under Cotton in *Feddâns* and Yield in *Qantârs*.

YEAR.	CULTIVATED AREA. (1)			AREA UNDER COTTON. (1).			PERCENTAGE UNDER COTTON.			TOTAL YIELD. (2)	Average Yield per *Feddân*.	YEA
	Lower Egypt.	Upper Egypt.	Total.	Lower Egypt.	Upper Egypt.	Total.	Lower Egypt.	Upper Egypt.	Total.			
	Feddâns.	Feddâns.	Feddâns.	Feddâns.	Feddâns	Feddâns.				Qantârs.	Qantârs.	
1894	—	—	4,796,250	912,602	53,344	965,946	—	—	20·1	4,619,233	4·78	1894
1895	—	—	4,874,456	927,426	70,299	997,735	—	—	20·4	5,256,128	5·27	1895
1896	—	—	4,942,641	967,634	83,115	1,050,749	—	—	20·2	5,879,479	5·60	1896
1897	—	—	5,047,698	1,029,141	99,010	1,128,151	—	—	22·3	6,543,628	5·80	1897
1898	2,887,802	2,200,085	5,687,887	1,028,643	92,619	1,121,262	35·6	4·2	22·0	5,588,816	4·98	1898
1899	2,952,803	2,233,032	5,185,835	1,064,949	88,358	1,153,307	36·1	4·0	22·2	6,509,645	5·64	1899
1900	2,994,604	2,236,694	5,231,298	1,143,042	87,277	1,230,319	38·2	3·9	23·5	5,435,480	4·42	1900
1901	3,012,331	2,255,060	5,267,391	1,144,566	105,318	1,249,884	38·0	4·7	23·7	6,369,911	5·10	1901
1902	3,071,562	2,263,003	5,334,565	1,169,106	106,571	1,275,677	38·1	4·7	23·9	5,838,790	4·58	1902
†1903	3,069,667	2,154,802	5,224,469	1,171,133	161,377	1,332,510	38·2	7·5	25·5	6,508,947	4·88	1903†
1904	3,073,758	2,303,021	5,376,779	1,193,298	243,411	1,436,709	38·8	10·6	26·7	6,313,370	4·39	1904
1905	3,157,321	2,246,570	5,403,891	1,255,900	310,702	1,566,602	39·8	13·8	28·9	5,959,883	3·80	1905
1906	3,132,538	2,207,100	5,339,638	1,260,107	246,184	1,506,291	40·2	11·2	28·0	6,949,383	4·61	1906
1907	3,167,077	2,235,639	5 402,716	1,289,268	313,956	1,603,224	40·7	14·0	29·6	7,234,660	4·50	1907
1908	3,174,627	2,151,885	5,326,512	1,298,901	361,514	1,640,415	40·9	15·9	30·8	6,751,133	4·12	1908
1909	3,122,410	2,251,572	5,373,982	1,326,588	270,467	1,597,055	42·5	12·0	29·7	5,000,772	3·13	1909
1910	3,100,233	2,245,119	5,345,352	1,325,834	316,776	1,642,610	42·8	14·1	30·7	7,495,600	4·56	1910
1911	3,022,304	2,241,554	5,263,858	1,347,536	363,705	1,711,241	44·6	16·2	32·5	7,383,740	4·31	1911
1912	3,038,932	2,246,522	5,285,454	1,346,254	375,561	1,721,815	44·3	16·7	32·5	7,497,859	4·36	1912
*‡1913	3,052,917	2,229,710	5,282 627	1,339,609	383,485	1,723,094	43·9	17·2	32·6	7,663,801	4·45	1913‡*
1914	3,019,510	2,003,720	5,023,230	1,373,243	382,027	1,755,270	45·5	19·1	34·9	6,450,573	3·67	1914
§1915	3,045,014	2,263,876	5,308,890	937,015	248,989	1,186,004	30·8	11·0	22·3	4,774,770	4·03	1915§
1916	3,012,983	2,219,288	5,232,271	1,289,869	365,643	1,655,512	42·8	16·5	31·9	5,060,389	3·06	1916
1917	3,057,553	2,261,595	5,319,148	1,293,789	383,521	1,677,310	42·3	17·0	31·5	6,293,424	3·75	1917
§1918	3,038,968	2,243,348	5,282,316	1,023,888	291,684	1,315,572	33·7	13·0	29·0	4,820,650	3·66	1918§

(1) From returns furnished by *sarafs*. (2) Figures supplied by Alexandria Produce Association. Subsequent to 1908, Sudan crop not included.
* First serious damage caused by pink boll worm. † Summer water supply, first supplemented from Aswân Reservoir.
‡ Summer water supply, increased by heightening of Aswân Dam. § Area under cotton restricted by decree.
A *feddân* = 1·038 acres. A *qantâr* of ginned cotton = 99 lbs.

TABLE B.—Cotton Crop in *Qantârs* previous to 1894.

Year.	Crop.	Year.	Crop.	Year.	Crop.	Year.	Crop.
1820	944	1839	159,301	1858	502,645	1877	2,503,610
1821	35,108	1840	193,507	1859	501,416	1878	1,680,595
1822	159,426	1841	211,030	1860	596,200	1879	3,123,515
1823	228,078	1842	261,064	1861	721,052	1880	2,792,184
1824	212,318	1843	153,363	1862	1,181,888	1881	2,846,237
1825	216,181	1844	344,955	1863	1,718,791	1882	2,293,537
1826	159,642	1845	202,040	1864	2,001,167	1883	2,686,382
1827	59,255	1846	257,492	1865	1,288,762	1884	3,591,486
1828	104,920	1847	119,985	1866	1,260,946	1885	2,904,842
1829	213,585	1848	257,510	1867	1,253,455	1886	3,025,965
1830	186,675	1849	394,816	1868	1,289,714	1887	2,996,000
1831	136,127	1850	384,439	1869	1,351,797	1888	2,723,000
1832	56,067	1851	670,129	1870	1,966,215	1889	3,238,000
1833	143,892	1852	477,390	1871	2,108,500	1890	4,159,405
1834	213,604	1853	477,905	1872	2,013,433	Delta Barrage completed.	
1835	243,230	1854	520,886	1873	2,575,648		
1836	315,470	1855	539,885	1874	2,206,443	1891	4,765,341
1837	238,833	1856	490,960	1875	3,007,719	1892	5,220,510
1838	134,097	1857	519,537	1876	2,439,159	1893	5,033,235

A *qantâr* of ginned cotton = 99 lbs.

APPENDIX.

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